SYSTRON DONNER

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Member THORN EMI Group

RS40-10A S2603B

INSTRUMENT DIVISION

ADDENDUM

The RS40-10A S2603B is similar to the standard model RS40-10A as described in the enclosed manual with special modification S2603B added.

Special Modification S2603B consist of:

- Special front panel with no meters.
- Shaft locks on potentiometers.
- 400 hertz ±20% 103.5 to 126.5 ac operation.
- Special power transformer T1; new part number 500737.
- Special MS connectors - see schematic D8323 for pin configuration.
  - ac connector MS3102R-18-4P
  - dc connector MS3124E-14-19S
- Refer to schematic D8323 for complete circuit description.

2727 Systron Drive • Concord, California 94518 • U.S.A.
Tel: (415)676-5000 • TWX: 910-481-9479 • Cable: SYSTRON DONNER
FSCM No. 52542

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INSTRUMENT DIVISION

TEST SHEET

SPECIALS

MODEL RS40-10A S2603B

TEST NO. 686A

SALES ORDER

QTY.

CUSTOMER SPEC. NO.

BATCH NO.

INPUT	103.5 - 126.5 VAC	FREQUENCY	400 +/- 20 Hz
LINE REG.	115 to 103.5 +/- 0.1% 115 to 126.5 +/- 0.1%	LOAD REG.	+/- 0.1%
RIPPLE RMS	1.0 mV	NOISE-RMS	
NOISE P-P	40 mV	TEMP. COEFF.	
STABILITY		RECOVERY TIME	.05% or 15mV in 50 uS
SLAVE TRACKING		O.V. SETTING	
CURRENT MODE		O.L. PROTECTION	
REMOTE PROG.	100 ohm/V +/- 0.25%		
TEMP. RANGE			
OUTPUT VOLTS	0 - 40.0 V ADJ FOR ZERO VOLTS (R90)		

UNLESS OTHERWISE NOTED, ALL OTHER TESTS COMFORM TO

STANDARD MODEL RS40-10ANM

SPECIAL NOTES J5-A(+S) Shall be less than or equal to 1.0V above initial output after disconnecting jumpers to + & - V. No I Mode data required.

SYSTRON DONNER
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MODEL RS40-10A

INSTRUMENT DIVISION

OPERATING AND SERVICE MANUAL

2727 Systron Drive • Concord, California 94518 • U.S.A.
Tel: (415) 676-5000 • TWX: 910-481-9479 • Cable: SYSTRON DONNER
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SYSTRON DONNER
INSTRUMENT DIVISION
2727 Systron Drive
Concord, California 94518

WARRANTY POLICY

I Warranty

Systron Donner Instrument Division warrants that at the time of shipment the products manufactured by Systron Donner and sold hereunder will be free from defects in material and workmanship and will conform to the current specifications published by Systron Donner's Instrument Division.

II Warranty

A The warranty period will be one year from the date of shipment. This warranty is extended only to the original buyer.

III Warranty Adjustments

A. If any defect within this warranty appears, Purchaser shall notify Seller immediately.

B Systron Donner agrees to repair or furnish a replacement for, but not install, any product which within the standard warranty shall, upon test and examination by Systron Donner, prove defective within the above warranty period.

C No product will be accepted for return or replacement without prior approval of Systron Donner. Upon such authorization and in accordance with instructions of Systron Donner, the product will be returned to the manufacturing location, shipping charges prepaid by Purchaser.

IV Exclusions from Warranty

A The foregoing warranty is in lieu of and excludes all other expressed or implied warranties of merchantability or fitness or otherwise.

B Systron Donner will not be liable for any special or consequential damages or for loss, damages or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with any other equipment or material, or from any other cause.

C The warranty does not extend to any product manufactured by Systron Donner which has been subjected to misuse, neglect, accident, improper installation or to use in violation of instructions furnished by Systron Donner.

D The warranty does not extend to or apply to any unit which has been repaired or altered at any place other than Systron Donner; by persons not expressly approved by Systron Donner; not to any unit, the serial number of which has been removed or defaced or Changed.

E This warranty applies to new equipment only and will cover repaired or replacement items only to the extent of the balance remaining of the items original warranty period noted in Paragraph II.

F All freight charges will be paid for by the Purchaser.

June, 1985

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SECTION 1

DESCRIPTION

1.1 INTRODUCTION

The Silicon Rack Series power supply is a flexible and dependable source of D.C. power which can be used to meet a variety of needs ranging in scope from inspection and production testing, to laboratory bench testing and systems applications.

The wide range of outputs available makes this unit well suited for use as a basic laboratory power source. The ability to provide power packaged in minimum space with high reliability meets the demands of most systems requirements.

All components used in the construction of the Silicon Rack units are of the higher quality available, and have been subjected to 100% incoming inspection.

Each electrolytic filter capacitor is of computer grade, and has been quoted by the manufacturer as having a life expectancy exceeding ten (10) years. All semiconductors are silicon for high temperature operation, and permit fully reliable operation at ambient temperatures up to 71°C without any derating, addition of heat sinks or forced air cooling. Each power transistor has been generously "derated" and temperature aged to provide high reliability. All rectifiers are hermetically sealed silicon types, and all zener diodes have been temperature stabilized.

1.2 GENERAL FEATURES

Output, Sensing, Remote Voltage Programming and Remote Current Programming terminals are located on terminal boards mounted on the rear panel of the unit. The power switch, power on indicator light, mode indicator light, current and voltage controls and appropriate metering devices are all located on the front panel. For convenience, additional output terminals have been provided on the front panel.

1.2.1 Constant Voltage Mode

A constant voltage is maintained across the output terminals at any pre-set value from zero to rated voltage output, provided that the load does not draw more than either the rated output current or more than the pre-set limiting current value determined by the front panel current control settings.

1.2.2 Constant Current Mode

Constant current operation is achieved by maintaining a constant voltage across an internal current sensing resistor. An automatic cross over network changes the mode of operation from Constant Voltage to Constant Current when the current demand reaches that of the pre-set current adjust control. The point at which the operating mode automatically changes is a function of variations in load conditions.

point at which the operating mode automatically changes is a function of variations in load conditions. The crossover point is adjustable, and can be established anywhere within the current and voltage range of the unit.

Automatic Current Limiting

Short circuit protection is provided by the Automatic Current Limiting circuit which limits the maximum output current under all load conditions. The point at which automatic current limiting occurs is variable, and may be selected anywhere from 1% of the rated current to the full rated current output of the unit. In the event of a short circuit, the output voltage drops to zero and returns to normal only when the short circuit is removed.

Mode Indicator

A front panel mode indicator light indicates when the unit is operating in either the constant current or current limiting mode of operation.

Automatic Overvoltage Protection (Optional Feature)

Automatic Overvoltage (OV) Protection is available as an option wherein special circuitry automatically tracks the programmed output voltage and prevents it from exceeding this output voltage. The voltage differential that will cause the OV to trip is approximately 5% or 1.5 volts above the programmed voltage. An internal sensitivity control is provided to desensitize the overvoltage protection circuit.

Remote Programming

Remote Programming is provided in both the voltage and current modes of operation. Both voltage and current may be remotely programmed over their entire ranges. The scale factor for Remote Voltage Programming is 100 ohms per volt. The Remote Current Programming is approximately determined by computing the value of the programming resistor using the formula $R_{PGM} = 100 \left(1 - \frac{\text{Load Current}}{\text{Rated Current}}\right)$.

1.3 PRECAUTIONARY MEASURES

Wire Size

To assure proper regulation under all load conditions, and to prevent severe distortions of the AC line voltage, it is very important to take into consideration the physical size and current handling capabilities of the input power line. Serious losses in regulation and an increase in ripple may result from underrated or overloaded AC input lines. The maximum AC impedance from the breaker box to the power supply input should not exceed 0.75 ohms.

Voltage Regulator and Inverter Inputs

Do not use voltage regulators or inverters as a primary power source. The outputs of these devices are usually not

1.3.3 Variable Transformer Input

If a variable transformer is to be used to test the power supply for low and high AC line operation, it must be able to supply at least twice the VA requirements of the power supply and load.

1.3.4 Systems Considerations

In systems applications it is recommended that each power supply input power line be run separately to the AC distribution box, in order to minimize cross coupling and interaction between equipment. Do not run sensitive signal leads such as the remote sensing leads in the same cable as the AC input cables should not be run in close proximity to the output load cable leads, if minimum ripple is desired.

1.3.5 Terminal Post Resistance

All terminals and shorting links serving Outputs, Sensing and Programming must be securely tightened before use. Serious loss of regulation and an increase in ripple can result due to a voltage drop caused by loose terminals and shorting links.

1.4 SPECIFICATIONS

Electrical and physical specifications for this unit appear on the following Trygon Specification sheet.

TRANSISTORIZED POWER SUPPLIES

SILICON RACK SERIES

CONSTANT VOLTAGE/CONSTANT CURRENT

RS Series

OUTPUT: 0-20 VDC/0-40 VDC/0-60 VDC/ 0-160 VDC/0-320 VDC

REGULATION, LINE: 0.01% or 3 mv

LOAD: 0.01% or 3 mv

RIPPLE: Less than 0.5 mv RMS

INPUT: 105-125 VAC, 55-65 cps

FEATURES

- ALL SILICON DESIGN
- +71°C OPERATION WITHOUT DERATING
- MODE INDICATOR LIGHT
- AUTOMATIC SHORT CIRCUIT PROTECTION
- REMOTE VOLTAGE PROGRAMMING
- REMOTE SENSING
- SERIES OR PARALLEL OPERATION
- NO TURN ON/TURN OFF TRANSIENTS

ELECTRICAL SPECIFICATIONS

CONSTANT VOLTAGE MODE WITH ADJUSTABLE CURRENT LIMITING

Input: 105-125 VAC, 55-65 cps. (200-240 VAC, 50, or 400 cps available).
Output: Floating; isolated from ground, 300 VDC max.
Regulation, Line: 0.01% or 3 mv,* for 105-125 VAC line change at any output without specifications.
Regulation, Load: 0.01% or 3 mv,* no load to full load at any output within specifications.
Ripple: Less than 0.5 mv RMS.
Stability: 0.05% or 18 mv* for 8 hours after warm-up. Measured at constant line voltage, load and ambient temperature.
Temperature Coefficient: (0.02% + 400μv)/°C.
High Stability Option (X): 0.01% or 2 mv* with a T.C. of (0.01% + 100μv)/°C.
Temperature Range: —20°C to +71°C†.
Recovery Time: 25 microseconds to recover within 0.05% or 15 mv* of output voltage for 100% step change in rated load.
Short Circuit Protection: Automatic Adjustable Current Limiting (ACL) variable from 1% to 100% of rated current.
AC Power Input Protection: Fuse.
Remote Programming: All units remotely programmable over output voltage range. Scale factor approximately 100 ohms/volt.
Remote Sensing: Maintains rated regulation directly at the load. Maximum line drop 0.5 volts per leg.
Voltage Adjustment Range: Continuously adjustable concentric vernier controls.

CONSTANT CURRENT MODE WITH ADJUSTABLE VOLTAGE LIMITING

Current Range: 1% to rated current output.
Voltage Compliance: 0 to rated output voltage.
Regulation, Line: 0.5% I_{rated} for 105-125 VAC line change at any output within specifications.
Regulation, Load: 0.5% I_{rated} output current change for the maximum change in load resistance within the rated voltage compliance range.
Ripple: 0.25% or 5 ma*.
Stability: 0.5% I_{rated} for 8 hours after warm-up. Measured at constant line voltage, load and ambient temperature.
Temperature Coefficient: 0.1% I_{rated}/°C.
Remote Programming: Fully programmable over complete current range. Programming resistance $R_{prgm} = 100\ (1\text{-}I_{meas}/I_{rated})$.

*Whichever is greater.
†When stacked without free air circulation temperature should be limited to +60° C.

TABLE 1

Model	Volts	Amps	*Impedance DC-1KC	W	H	D	Weight (lbs.)
		OUTPUT		DIMENSIONS			
RS20-7.5A	0-20	0-7.5	0.002	19	3½	14⅜	42
RS20-15A	0-20	0-15	0.001	19	3½	14⅜	47
RS40-5A	0-40	0-5	0.004	19	3½	14⅜	43
RS40-10A	0-40	0-10	0.002	19	3½	14⅜	45
RS60-7.5A	0-60	0-7.5	0.004	19	3½	14⅜	47
RS160-1A	0-160	0-1	0.008	19	3½	14⅜	45
RS160-3A	0-160	0-3	0.005	19	3½	14⅜	49
RS320-1A	0-320	0-1	0.016	19	3½	14⅜	49
RS320-1.5A	0-320	0-1.5	0.020	19	3½	14⅜	49

*Nominal

GENERAL AND PHYSICAL SPECIFICATIONS

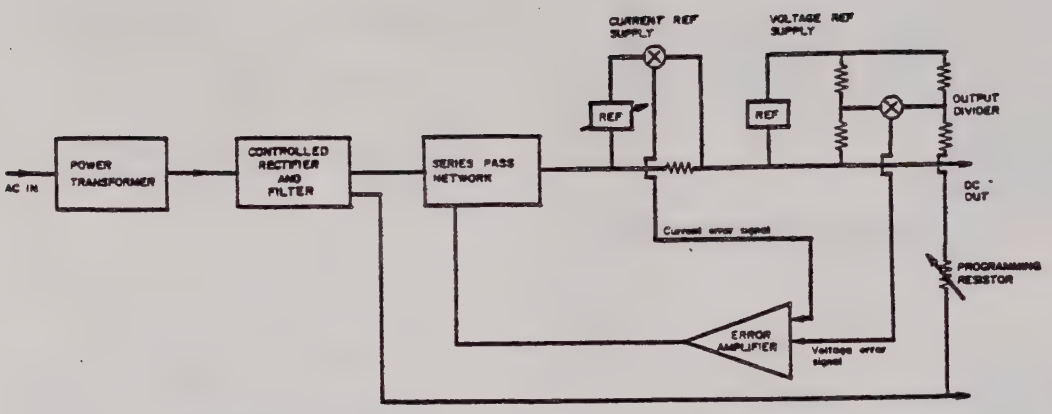
Operational Modes: Constant Voltage with adjustable current limiting; Constant Current with adjustable voltage limiting; Automatic Crossover.

Mode Indicator: Front panel mode indicator light indicates when supply is operating in the constant current or current limiting mode.

Controls:
Voltage: Coarse and Fine; 0 to rated output; front panel.
Current: Coarse and Fine; 1% I_{rated} to rated output; front panel.
Input Power: Front panel switch and indicator.

Metering:
Voltage: Front panel voltmeter.
Current: Front panel ammeter.

Terminals:
Front Panel: Pos. Output (+V) — Neg. Output (—V) — Ground (G).
Rear Panel: Pos. Output (+V) — Neg. Output (—V) — Pos. Sensing (+S) — Neg. Sensing (—S) — Ground (G) — Remote Voltage Programming (REM) — Remote Current Programming (RCP).



Block Diagram — Silicon Rack Series

DESCRIPTION

• The Trygon SILICON RACK SERIES units are designed for laboratory and systems applicatons. Their unique design provides operating flexibility and high reliability at high power output levels.

• CONSTANT VOLTAGE and CONSTANT CURRENT operation is provided with automatic crossover from one mode into the other. In the voltage mode, adjustable current limiting is provided while the current mode provides adjustable voltage limiting. A mode indicator light on the front panel indicates when the unit is operating in the constant current or current limiting mode. All units in this series have provisions for remote programming of voltage and current.

• MAXIMUM RELIABILITY is achieved through the use of proven design techniques, components selection, and rugged construction. High quality components are used throughout and power transistors are generously derated and temperature aged, zener diodes are temperature stabilized, electrolytic capacitors are computer grade with rated life in excess of 10 years, transformers meet or exceed the requirements of MIL-T-27A, and all Trygon power supplies are manufactured in accordance with the Quality Assurance requirements of MIL-Q-9858. The Silicon Rack Series units carry the Trygon 5 year warranty.

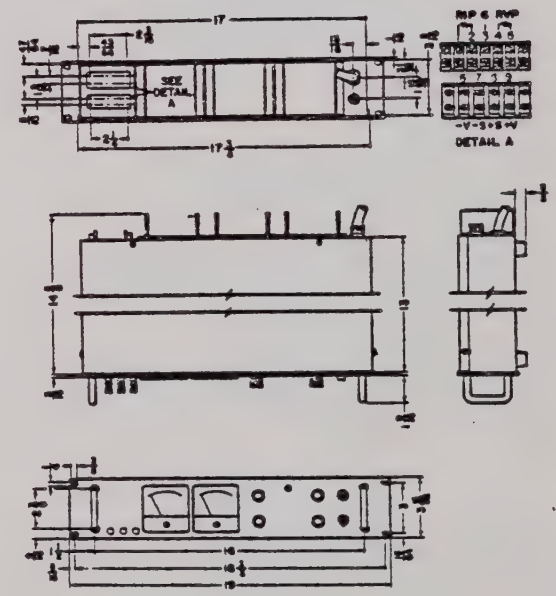
• AUTOMATIC TRACKING OVERVOLTAGE PROTECTION (OV)* is a patented automatic fail-safe overvoltage protection circuit pioneered by Trygon. The OV circuit protects the load against receiving a voltage in excess of the programmed output voltage of the supply. The protection point automatically tracks the programmed output voltage.

• SERIES OR PARALLEL OPERATION to increase voltage or current can easily be accomplished by connecting two or more supplies of this series together.

• SPECIAL MODIFICATIONS: The standard Silicon Rack RS Series units are available in five voltage ranges. Their outstanding versatility, reliability, and operating convenience make them ideally suited for a large majority of applications in standard form.

• TRYGON ELECTRONICS, INC., has available a number of standard options and modifications to extend even further the range of performance or application of each power supply. In addition, the Trygon Application Engineering department is available for consultation on specific applications.

*Optional



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SECTION 2

INSTALLATION AND OPERATION

2.1 MECHANICAL INSTALLATION

2.1.1 Rack Mounting

Any standard EIA relay rack will accomodate the Trygon Silicon Rack Series power supplies in only 3 1/2 inches of vertical mounting space. Mounting of the unit is easily accomplished by inserting four mounting screws through the slotted holes provided in the four corners of the front panel of the power supply, and on into the matching threaded holes of the relay rack.

2.1.2 Bench Use

Though designed primarily as a rack mounting unit, the Silicon Rack Series power supply may be operated in a bench type configuration as well. It is therefore fully enclosed in a protective metal case, and equipped with rubber mounting feet which serve to protect the unit and the surface upon which it rests from scratching, and to provide an airflow channel under the unit for ventilation purposes.

2.2 ELECTRICAL CONNECTIONS

2.2.1 AC Input

The unit is supplies with a heavy duty 3 wire line cord equipped with molded plug and ground strap to provide a path for AC input power.

The power handling ability of the AC power lines feeding AC power to the line cord must be considered, as serious losses in regulation and substantial increases in ripple can occur as a result of insufficient power handling capacity of these lines. The AC impedance from the breaker box to the power supply input connector should not exceed 0.75Ω's. Any movable electric contact surface (such as the wiper arm of a variable transformer) should be kept clear of impednace producing oxide coatings.

Care should be exercised in selecting the proper wire size for the AC input lines. The figures listed in Table 2-1 will serve as a guide in making this selection.

2.2.1 AC Input (cont'd)

TABLE 2-1 - AC INPUT WIRE SIZE	
Length of Run (Single Lead)	Wire Size (AWG Standards)
10 feet or less	14
10 feet to 20 feet	12
20 feet to 50 feet	10
50 feet to 100 feet	8

2.2.2 Barrier Strips

Two barrier strips mounted on the rear panel provide output, sensing and programming connections. On the upper 5 terminal barrier strip, terminals 1 and 2 provide Remote Current Programming connections, terminals 4 and 5 provide Remote Voltage Programming connections, and terminal 3 is utilized as a ground connection. On the lower 4 terminal barrier strip, terminals 6 and 7 are utilized as negative voltage and sensing connections (respectively) and terminals 8 and 9 serve as positive sensing and voltage connections (respectively).

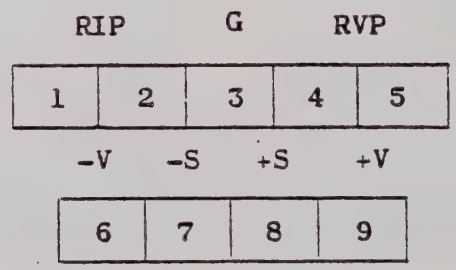


FIGURE 2-1
BARRIER STRIP
TERMINAL DESIG.

2.2.3 DC Output

DC output voltage is available at both front and rear panel locations, and may be sensed (monitored) either at the output terminals of the power supply (Local Sensing) or at the load itself (Remote Sensing).

2.2.4 Local Sensing

Local sensing of the output voltage may be made at the rear panel output terminals. The shorting links must be placed across rear panel terminals. The shorting links must be placed across rear panel terminals, 6 and 7 (-V and -S), and across terminals 8 and 9 (+S and +V).

2.2.5 Remote Sensing

Remote sensing of the output voltage is available only if the load is connected to the rear panel output terminals. The shorting links between rear panel terminals 6 and 7 (-V and -S), and terminals 8 and 9 (+S and +V) must be removed, and separate

sensing leads installed between sensing terminals 7 and 8 (-S and +S) and the load.

2.2.6 Local Programming

Local programming of either current or voltage is available by shorting the appropriate rear panel terminals. For local current programming operation, a shorting link should be placed across barrier strip terminals 1 and 2 (RIP). For local voltage programming operation, a shorting link should be placed across barrier strip terminals 4 and 5 (RVP). In both local current programming and local voltage programming operation, the output amplitude is dependent upon the setting of the appropriate front panel adjustment control.

2.2.7 Remote Programming

Remote programming of both voltage and current may be achieved by removing the shorting link from the appropriate barrier strip terminals and substituting a remotely operated adjustment control resistance in its place. In the remote programming mode of operation, the scale factor required for the remotely operated voltage adjustment control is 100Ω's per volt. In order for this remotely operated adjustment control to function properly, front panel VOLTAGE ADJUST (R66) and VOLTAGE VERNIER (R67) adjustment controls must be set fully CCE. Operation of this power supply without either shorting link or remotely operated adjustment control connected across remote voltage programming barrier strip terminals 4 and 5 (RVP), will result in an unregulated output voltage.

The required size of the remote current programming resistor may be determined by use of the formula $R_{pgm} = 100 \left(1 - \frac{\text{Load Current}}{\text{Rated Current}}\right)$, where R_{pgm} is the remote program resistor, load current refers to the desired output current, and rated current refers to the maximum output current, and rated current refers to the maximum output current of the unit. To obtain proper operation of the remotely controlled current adjust control, it is necessary that front panel CURRENT ADJUST (R12) and CURRENT VERNIER (R13) adjustment controls be set fully CW. Operation of this power supply without either shorting link or remotely adjusted current programming barrier strip terminals 1 and 2 (RIP) will result in a complete loss of output current.

2.2.8 Shorting Links

The unit is shipped with shorting links in place across terminals 1 and 2, 4 and 5, 6 and 7, and 8 and 9 of the barrier strip. In this configuration, local programming and sensing is available at the barrier strip terminals. Table 2-2 lists the various shorting link connections and their functions.

2.2.8 Shorting Links (Cont'd)

TABLE 2-2 - SHORTING LINK APPLICATION

Terminals	Condition	Function
6 and 7 8 and 9	Shorted	Local sensing and regulation at rear panel output terminals
6 and 7 8 and 9	Ext. Sense Leads	Remote sensing and regulation at load
4 and 5	Shorted	Voltage programmed locally, output dependent upon voltage adjust pots
4 and 5	Ext. PGM res.	Voltage programmed remotely, output dependent upon size of PGM resistor
1 and 2	Shorted	Current programmed locally, output dependent upon current adjust pots
1 and 2	Ext. PGM res.	Current programmed remotely, output dependent upon size of PGM resistor

2.3 CONTROLS

2.3.1 Front Panel

TABLE 2-3 - FRONT PANEL CONTROLS

Symbol	Name	Function
S1	AC POWER	Power switch, controls input power
R66	VOLTAGE ADJUST (Coarse)	Potentiometer, adjusts voltage output
R67	VOLTAGE ADJUST (Vernier)	Potentiometer, adjusts voltage output
R12	CURRENT ADJUST (Coarse)	Potentiometer, adjusts current
R13	CURRENT ADJUST (Vernier)	Potentiometer, adjusts current

2.3.2 Internal

All internal control settings have been factory pre-set and require no additional adjusting. However, if it should become necessary to adjust any of the internal controls due to circuit changes caused by component ageing or replacement, refer to the calibration section of this instruction manual.

2.4 OPERATION

2.4.1 Control Settings

Set all front panel controls fully CW so that the unit will operate in the Voltage rather than Current Limiting mode.

2.4.2 Shorting Links

If Local Sensing rather than Remote Sensing operation is desired, ascertain that shorting links are in place across the appropriate terminals.

2.4.3 Grounding

Either side of the Output may be grounded, or the Output may be used in a floating condition.

2.4.4 Power On

Connect the power supply to a suitable source of 115 VAC, 60 cycle power. Set POWER switch S1 to AC-ON, and observe that pilot lamp DS1 glows.

2.4.5 Warm-Up

No warm-up time is necessary to place the unit into operation. However, a 30 minute warm-up period is recommended to reach rated stability.

2.4.6 Series Operation

To operate two or more power supplies in a series configuration, connect the output of each power supply in series. When operating in this mode, it is necessary to adjust the output of each unit independently. The output voltage is equal to the sum of the voltage settings of each power supply.

2.4.7 Parallel Operation

A) With rated resistive load connected across the output of power supply A as shown in Fig. 2-2A, set VOLTAGE ADJUST control to desired output voltage, and set CURRENT ADJUST control for maximum rated output current.

B) Connect power supply B as shown in Fig. 2-2B. With no load across the output, set VOLTAGE ADJUST control for an output voltage 2 volts higher than the output voltage of power supply A. Place a short across the output terminals, and set the CURRENT ADJUST control for 1/2 the total load current requirement.

C) Remove all former output loads and connect the outputs of power supplies A and B in parallel with each other, and in parallel with tne load, as shown in Fig. 2-3.

D) If parallel operation of these two power supplies is desired for a systems application, it is important that both units be turned on simultaneously. It is therefore recommended that both power supplies be connected to a single large circuit breaker. Maximum output current will be twice that of either of the two power supplies, while minimum output current will be that of either of the two power supplies, while minimum output current will be that of power supply B, or half the total load current.

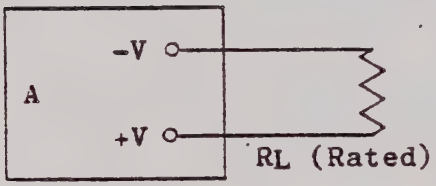


FIGURE 2-2A

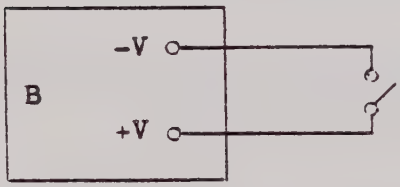


FIGURE 2-2B

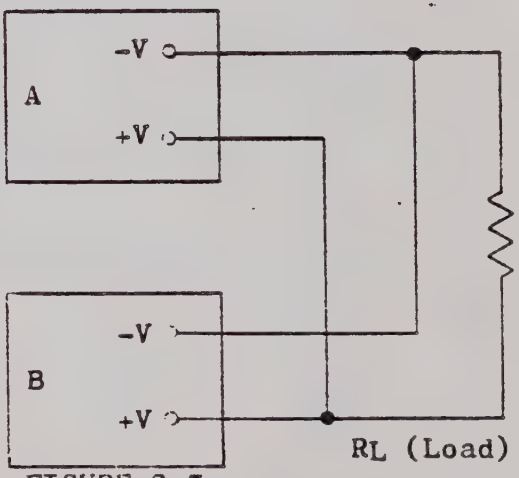


FIGURE 2-3

NOTE: If parallel operation of Trygon power supplies utilizing Overvoltage (OV) Protection is desired, consult the factory for special instructions.

SECTION III - THEORY OF OPERATION

3.1 GENERAL

The purpose of the Model RS40-10 Power Supply, is to transform and rectify the AC input into a well regulated, stable and adjustable DC output. In performing these functions, the circuitry of the unit may be broken down into six basic sections, which shall be referred to in the following order:

1) Primary Input
2) Reference Supply
3) Pre-Regulator
4) Series Regulator
5) Comparator
6) Error Amplifier

3.2 CIRCUIT ANALYSIS

The circuitry of this power supply has been outlined in simplified form in the Block Diagram located at the rear of this section. As each basic circuit is described, it will be advantageous to refer to the Block Diagram and the Schematic Diagram located at the rear of the Appendice Section of this instruction manual.

3.2.1 Primary Input

Input power is obtained through transformer T1, full wave rectifier diode sets CR1 and CR2, CR3, CR4, CR5 and CR6, and filter capacitors C1 and C8. Each rectifier set provides the necessary DC voltages to the various power supply sub-sections.

When switch S1 is set to ON, pilot lamp DS1 illuminates and AC power is applied to T1. Regulated DC output voltage is immediately available from the power supply.

3.2.2 Reference Supply

The rectified and filtered voltage from CR1, CR2 and C1 is pre-regulated by zener diode CR13. This provides a stabilized DC voltage to Q2 whose output is regulated by zener diode CR15. Q1 controls the drive to Q2 and in turn is controlled by Q2. The voltages developed across CR14 and CR15 are highly stable reference voltages established at a higher positive potential than the positive output of the supply.

3.2.3 Pre-Regulator

The purpose of the pre-regulator is to maintain the unregulated input voltage on input capacitor C8 at a suitable value compared to the output voltage in order to lower the power dissipation across the Series Pass section.

The method used to accomplish this is to "fire" a pair of SCR's (silicon controlled rectifiers) CR9 and CR10 at controlled points along the input sine wave to increase or decrease the potential to which the input capacitor may charge. The SCR's are "fired" (allowed to pass current) by the application of a positive pulse at the junction of R35 and R37 from unijunction transistor Q12.

The unijunction transistor is able to trigger the SCR's by charging C13 sufficiently to cause Q12 to conduct. The timing of Q12 to trigger the SCR's is a function of the voltage across series pass transistors Q13, Q14, Q15 and Q16 and the AC voltage referenced by CR22 and CR23 and the circuitry of R43 and R44.

The SCR's are turned off with each alternate half cycle of the input sine wave. R43 is a factory set adjustment that sets the optimum full load firing point of the SCR's.

3.2.4 Series Regulator

The pre-regulated DC voltage from the SCR's is directed through Series Pass transistors Q13, Q14, Q15 and Q16 whose conduction is controlled by drivers Q17, Q18 and Q19. Conduction of

3.2.4 Series Regulator (Cont'd)

these drivers causes the Series Pass transistors to act as a variable resistor in accordance with the needs of the power supply to increase or decrease the output voltage and current. The drivers in turn are controlled by Q7 in the error amplifier.

3.2.5 Comparator

The voltage sensing and comparison is accomplished by Q10 and Q11 arranged as a differential amplifier. A sample of the output voltage on the base of Q11 is compared to the reference voltage on the base of Q10. An unbalance caused by a change in output voltage or by a change in the setting of voltage adjust resistors R66 and R67 will appear as a voltage change in the collector of Q11.

3.2.6 Error Amplifier

The voltage change from Q11 is amplified by Q7 which in turn controls series pass driver Q19.

3.3 OPTIONAL FEATURES

3.3.1 Overvoltage (OV) Protection

If the output voltage should rise above the programmed output level, a portion of the signal developed across OV Sensitivity Control R90 will cause Q22 to conduct, which in turn will drive Q23 into conduction.

The purpose of this regenerative or latching action is to cause a sharp OV pulse to be applied to the gate lead of SCR CR34 in the shortest possible time, placing in effect, a short across the output of the unit. When SCR CR34 "fires" CR37 also conducts, causing through Series Pass driver Q19, a reduction in the conduction of the Series Pass circuit.

If the overvoltage condition is caused by a short in the Series Pass circuit, SCR CR34 will "fire", and fuse F2 will open.

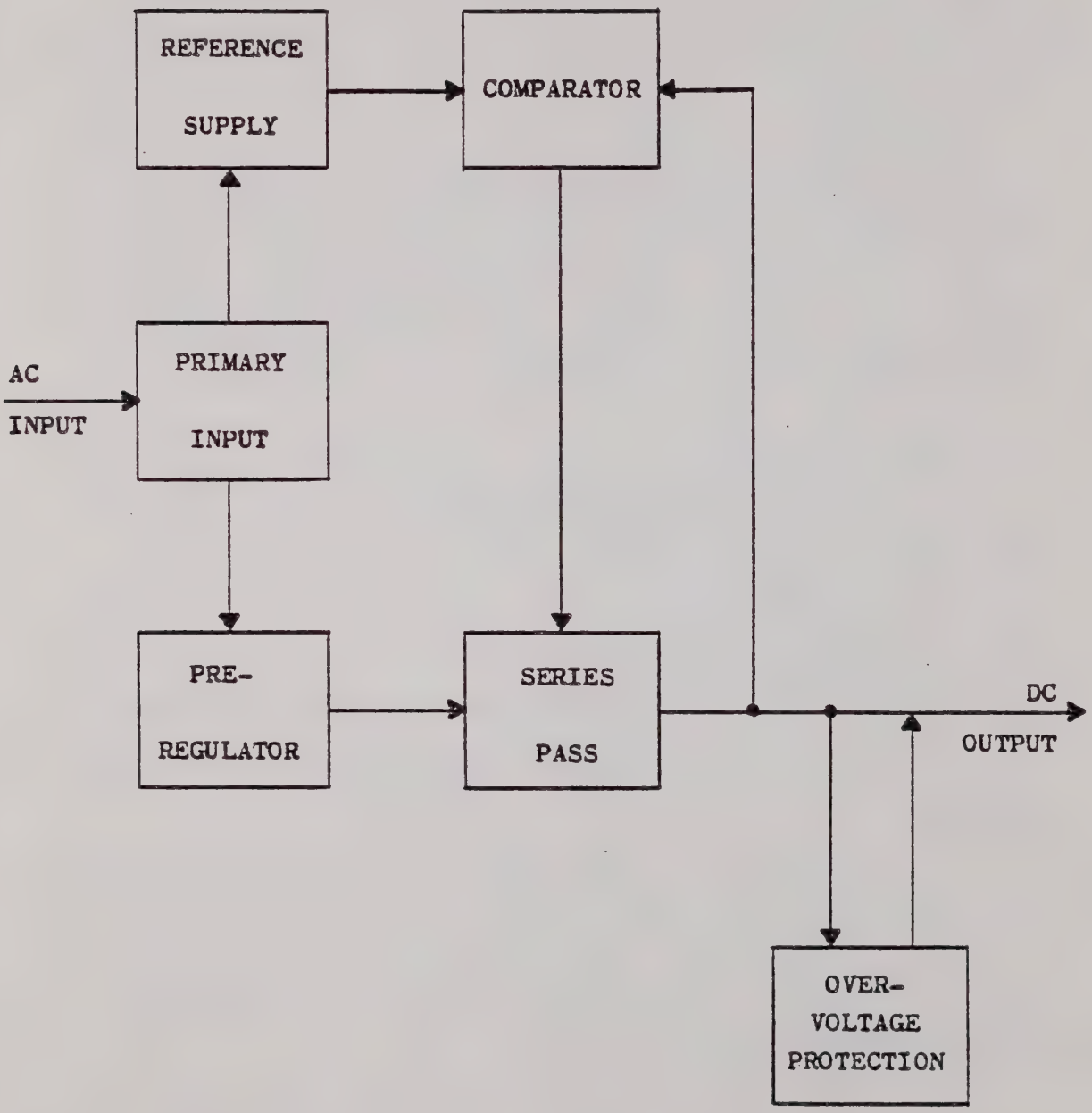


FIGURE 3-1 - BLOCK DIAGRAM

SECTION IV - MAINTENANCE

- WARNING -

High Voltages Are Present
Use Caution

4.1 GENERAL

This power supply is a precision instrument. It is strongly recommended that only experienced trouble shooting personnel perform trouble shooting operations or attempt to repair the unit. If the power supply appears to be malfunctioning at all, the following procedure is recommended for isolating possible defects.

4.2 LOADS AND INTERCONNECTIONS

1) Disconnect all loads and interconnections.
2) Connect a resistive load across the output terminals, and operate the unit to determine whether the fault lies within the unit or externally. Observe that Shorting Links are in place across terminals 1 and 2, 4 and 5, 6 and 7, and 8 and 9, and that all connections are tightly made.

4.3 TROUBLESHOOTING

1) Set VOLTAGE ADJUST control R66 and VOLTAGE VERNIER control R67 fully CW. Use a 20,000 ohms per volt voltmeter or oscilloscope to check the voltages across the various circuit components listed in the Troubleshooting tables of this section. Any reading

4.3 TROUBLESHOOTING (Cont'd)

which is grossly incorrect indicates that the stage being tested or the one immediately preceding it, is defective. The Block Diagram, Schematic Diagram and appropriate sections of the Theory of Operation will prove helpful in any troubleshooting work. Proper polarity to be observed when testing can be easily obtained from the Schematic Diagram.

2) If voltage checks show no noticeable deviations from the prescribed values, disconnect AC power and proceed with point to point resistance checks across pots, switches, diodes, resistors, transistors in that order.

3) When the trouble is of an intermittent nature such as poor regulation, ripple etc., the use of an oscilloscope to determine dynamic changes will be necessary. The section on Theory of Operation should be consulted to determine circuit performance with varying output conditions.

4.3.1 Reference Supply

TABLE 4-1 REFERENCE SUPPLY

Measured Across Component	DC Voltage Reading ±10%
CR14	6.5
CR15	9.3
R5	8.6
R3	5.9
CR13	24

4.3.2 Comparator

TABLE 4-2 COMPARATOR VOLTAGES	
Measured Across Component	DC Voltage Readings ±10%
CR19	0.6
R24	6.2
R26	3.1
R33	.85
R32	2.0
R27	2.5
R29	5.0
R30	5.0
R31	6.0

SECTION V - CALIBRATION

5.1 GENERAL

The following adjustments should be made when necessary to assure optimum operating characteristics and maximum efficiency of the Trygon power supply.

5.2 TEST EQUIPMENT REQUIRED (or equivalent)

(A) Oscilloscope, Tektronix Type 561
(B) Differential Amplifier Plug In, Tektronix Type 63
(C) Time Base Plug In, Tektronix Type 67
(D) Differential VTVM, Fluke Model 825A
(E) AC VTVM, Hewlett Packard Model 400D
(F) VOM, Simpson Model 260
(G) Variable Auto Transformer, Powerstat Type (20 Ampere Rating)

5.2.1 Shorting Link Application

For test purposes, shorting links should be connected across terminals 1 and 2, 4 and 5, 6 and 7, and 8 and 9 to provide local sensing and local current and voltage programming. To reduce pick up, shielded wire must be used for all connections between test equipment and the power supply being tested. To prevent ground loops, it is important that only one ground connection be made, as shown in Figure 5-1 and Figure 5-2. Tighten all terminal connections as securely as possible, and set all front panel controls fully CW.

5.3 CALIBRATION PROCEDURE

5.3.1 Pre-Regulator

A) With power supply operating without a resistive load across the output terminals, vary VOLTAGE ADJUST control until 50% of rated voltage output is indicated on the D.C. voltmeter.

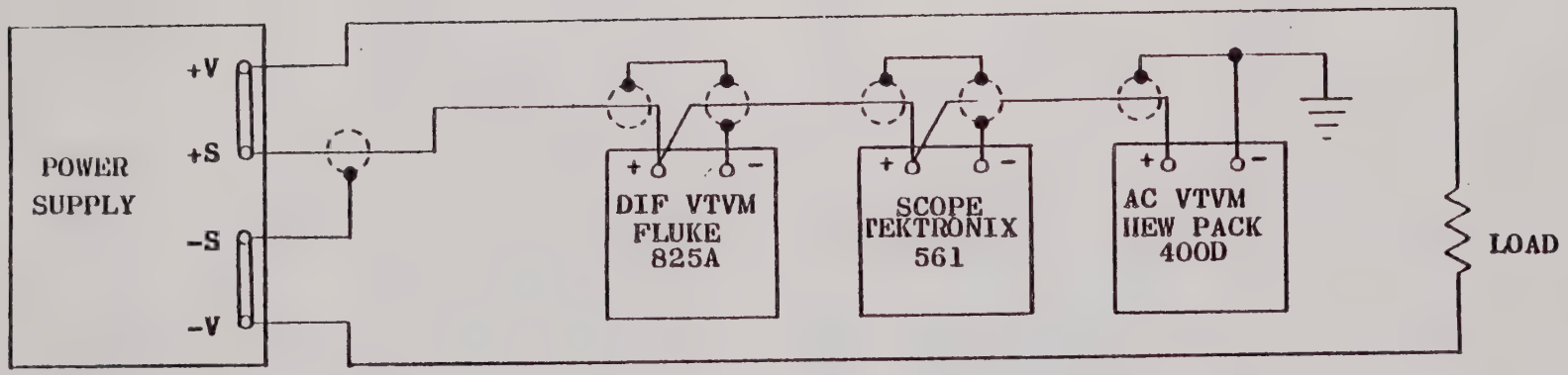


FIGURE 5-1
CONSTANT VOLTAGE OPERATION

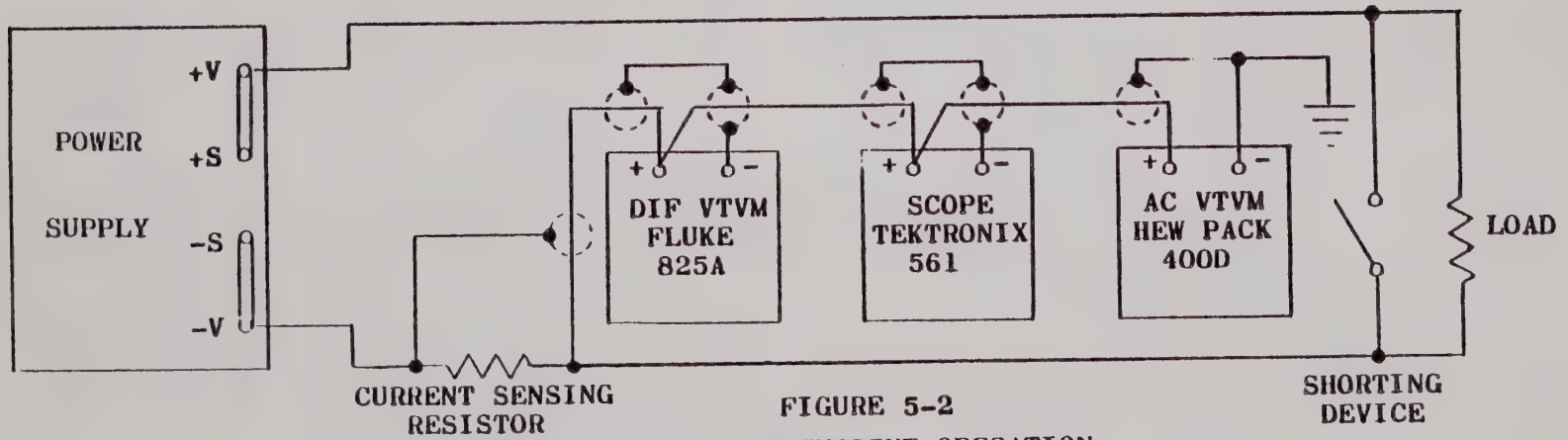


FIGURE 5-2
CONSTANT CURRENT OPERATION

5.3.1 Pre-Regulator (Cont'd)

Set POWER ON switch S1 to OFF, and connect resistive load across the output terminals. Set POWER ON switch S1 back to ON, and adjust resistive load for rated current setting on ammeter.

B) Set oscilloscope to D. C. triggering mode and connect scope input across the positive terminals of input capacitor C8 and output capacitor C10.

C) Adjust R43 for a nominal 9 VDC and a balanced 120 cps sawtooth waveshape.

D) Vary AC input line voltage between 105 and 125 VAC. Observe that the 120 cps sawtooth waveshape remains balanced and does not vary in amplitude more than 20% of the pre-set value (9 volt nominal).

5.3.2 Current Adjust Controls

A) Maximum Current

Connect a test ammeter having a full scale current indicating capacity of 150% that of the rated current output across the output terminals of the power supply. (Set all front panel controls fully CCW.) Apply power to the unit under test and slowly rotate CURRENT ADJUST control R12 and CURRENT VERNIER control R13 fully CW. Observe that the maximum current obtainable is approximately 120% that of the rated current output. If it is not possible to achieve 120% of the rated current output, adjust Maximum Current control R6 until that value is attained. Set AC Power Switch to OFF.

Connect a suitable load resistance across the output terminal connections. The load resistance must be able to dissipate the rated power of the unit (P = IE) and must be of sufficient value to yield the rated output current when the rated voltage is applied. Set AC Power Switch to ON. Note the voltage indicated on the Differential VTVM. Disconnect the resistive load from the output and observe the voltage indicated on the Differential VTVM. The maximum change in output voltage should not exceed by more than 0.01% or 3mv (whichever is greater) that of the output voltage indicated with the load resistance applied across the output terminals.

5.3.2 Current Adjust Controls (Cont'd)

If it is not possible to maintain the load regulation as stated in the preceding paragraph, re-adjust Maximum Current control R6 slightly and re-check the load regulation. Further minor adjustment of Maximum Current control R6 may be necessary to achieve both proper load regulation and 120% of rated current output.

B) Minimum Current

Connect test ammeter, having a full scale current indicating capacity of 100ma, across output terminals in place of a load resistor. Set all front panel controls fully CCW and apply power to the unit under test. Slowly rotate VOLTAGE ADJUST control in a CW direction, until current meter indicates a current flow somewhere between 0-50ma. Adjust Minimum Current control R11 for a nominal current indication of 25ma. Set POWER ON switch S1 to OFF.

5.3.3 Constant Voltage Operation

A) Load Regulation

With the equipment connected as shown in Figure 5-1, connect a suitable load resistance across the Output terminal connections. The load resistance selected must be able to dissipate the rated power of the unit (P = EI) and must be of sufficient value to yield the rated output current when the rated voltage is applied. Note the voltage indicated on the Differential VTVM. Disconnect the resistive load from the output. The maximum change in output DC voltage indicated on the Differential VTVM should not exceed by more than 0.01% or 3mv (whichever is greater) that of the output voltage indicated with the load resistance applied across the output terminals.

B) Line Regulation

Place the resistive load across the output and note the voltage indicated on the Differential VTVM. Vary the input line voltage between 105 and 125 VAC. The maximum change in output voltage should not exceed by more than 0.01% or 3mv (whichever is greater) that of the output voltage measured at either

5.3.3 Constant Voltage Operation (Cont'd)
extreme of the AC input.

C) Ripple Voltage

In order to reduce pickup, shielded test leads should be used in making ripple measurements. With the resistive load connected across the output terminals, measure the AC ripple with the AC VTVM. Vary the input line voltage ±10% about the nominal value. The maximum ripple amplitude should not exceed 0.5mv RMS.

5.3.4 Constant Current Operation

A) Load Regulation

With the equipment turned off, disconnect the resistive load from the output terminals. Connect a small current sensing resistor in series with the resistive load and then connect the load back across the output terminals. Selection of the proper value for the current sensing resistor may be easily made using the formula $R_S = \frac{I}{I_R}$ where R_S = Value of Current Sensing Resistor and I_R = Rated Load Current. Connect the equipment as shown in Figure 5-2, and apply power to the power supply.

Vary the VOLTAGE ADJUST controls and resistive output load as necessary, to achieve rated current and voltage output. Decrease the load resistance until current meter reading exceeds full scale indication. Rotate CURRENT ADJUST control CCW to return the current meter reading to full scale. Observe that the output voltage has decreased from its previous full scale reading, and that increasing the VOLTAGE ADJUST controls has no effect upon the output voltage or current. This indicated that the unit is now operating in the Constant Current Mode.

Measure the voltage across the small sensing resistor. Compute and note the current flow through this resistor. Change the output load from the resistive load previously used, to a

5.3.4 Constant Current Operation (Cont'd)

short. Again measure the voltage across the small sensing resistor and compute the value of the current flow through this resistor. The change in current should not exceed by more than 0.5% the rated current previously noted with a full resistive load across the output.

B) Line Regulation

Replace the resistive load across the output and measure the voltage drop across the small sensing resistor. Compute and note the current flow ($I = \frac{E}{R}$) through this resistor.

vary the input line voltage ±10% about the nominal value. Note the maximum change in voltage across the sensing resistor and compute the maximum current flow. The maximum change in current should not exceed by more than 0.5% the rated current previously noted at either extreme of the AC input.

C) Ripple Current

With the AC input line voltage adjusted to the nominal AC input line value and the resistive load connected across the output, measure the amplitude of the AC ripple as seen across the sensing resistor with the AC VTVM. Compute and note the current flow. Vary the AC line voltage ±10% about the nominal value. Measure the maximum voltage drop and compute the maximum current flow. The maximum ripple current must not exceed by more than 0.25% or 5ma (whichever is greater) that of the current flow noted during nominal input line voltage.

5.3.5 Overvoltage (OV) Sensitivity

The sensitivity of the Overvoltage Protection circuit is determined by the setting of Overvoltage Sensitivity control. This control is factory pre-set to cause a short circuit to be applied across the output of the unit of the output voltage attempts to rise more than 5% or 1.5 volts above the programmed

5.3.5 Overvoltage (OV) Sensitivity (Cont'd)

voltage.

Overvoltage control R90 may be set to cause the overvoltage circuit to operate at any point between 2 VDC and 20VDC.

The point at which R90 should be set to cause automatic shut down of the unit may be easily selected by first setting, the output voltage of the power supply to the desired amplitude, and then slowly rotating R90 in a CCW direction, until the output of the unit suddenly drops to zero. Voltage adjust control R91 should then be set to some point below that selected for automatic overvoltage operation, and the unit turned off and back on again in order to reset for operation.

ITEM NO.	SIZE	PART NUMBER	DESCRIPTION	REFERENCE NO.	ASSY QTY	ACT CODE	ISS. QTY	SHT QTY
1		009186	SHIPPING ASS'Y		XX			
3	D		SCHEMATIC	083230	1	R		
4	A		SPECIAL TEST DATA	686A	1	R		
5	D	083328	TOP COVER		1	2		
7	A	FD148121	FRONT PANEL ASS'Y		1	2		
8	D	065068	FRONT PANEL		1	2		
9		880030	AC-SWITCH NST52K	S1	1	1		
10		770020	PILOT LIGHT	DS1	1	1		
11		770023	INDICATOR LAMP	DS2	1	1		
12		600010	POTS 10Ω 2W	R13	1	1		
13		600060	125Ω 2W	R12, 67	2	1		
14		600279	4.5KΩ 2W	R66	1	1		
15		620676	RESISTOR 29.95K 1/2W	R86	1	1		
16		102647	BINDING POSTS - BLK		1	1		
17		T920160	" " - RED		1	1		
18		102648	" " - WHT		1	1		
19	B	T049260	COVER SUPPORT		1	2		
20		810220	SHAFT-LOCKS		4	1		
24	A	FD148111	CHASSIS ASS'Y		1	2		
25	D	TI09554	CHASSIS		1	2		
26	A	500737	XFORMER (400 Hz)	T1	1	2		
27		820320	CAPACITOR 10,000MF-60V	C8	1	1		
28		820317	9,300MF-50V	C10	1	1		
29		820051	950 MF-50V	C1	1	1		
30	B	T046598	CAPACITOR BKT		2	2		
31		T900048	" "		1	2		
32		T900070	" "		1	2		
33		800210	CAPACITOR .15MF-250	C21, 24, 25	3	1		

MODEL	JOB NO.	LOT QTY	LOT NO.		SIZE 52540
PLANNER	PREP DATE	SYSTRON DONNER CORPORATION			
	CHK'D	SHIPPING ASS'Y			
MAT. DUE	APP'D	RS40-10AS2			
B/U REQ.		DRAWING NO.			
B/U COMP	USED ON	SIZE D	P 009186	REV	
		SHEET 1			

FORM EB-A 11 JUL 75

ITEM NO.	SIZE	PART NUMBER	DESCRIPTION	REFERENCE NO.	ASSY QTY	ACT. CODE	ISS. QTY	SP QT
34			CHASSIS ASS'Y					
363		083288	MTG. BRACKET		2	2		
37		650040	RESISTOR .1Ω 25W	R1A	1	1		
38		650660	500Ω 25W	R39	1	1		
39		650520	100Ω 25W	R1	1	1		
40		6A0496	800Ω 5W	R78	1	1		
41		610170	820Ω 1/2W	R71	1	1		
43		800285	CAPACITOR .47MF-250V	C22	1	1		
44		720129	DIODE IN1199A	CR25	1	1		
45		850033	TERM. STRIP	TB1 TB4	2	1		
46A			DIODE-CAPACITOR MTG	PD6933A	1	R		
47		T920040	HANDLES		2	1		
48A		T081518	NAME-PLATE	PD18672	1	1		
49		850107	TERM. STRIP 170-6	TS3	1	1		
50		800147	CAPACITAR .047MF-250V	C5 12	2	1		
51		810010	10MF-50V	C11 16	2	1		
52A			TRANSFORMER ASS'Y	PD7604	1	R		
53B		T028720	MTG-BRACKET		2	2		
54		840192	RUBBER FEET		4	1		
56A		PD15624	TRANSISTOR BKT ASS'Y		1	2		
57B		048290	TRANSISTOR BKT		1	2		
58		700080	TRANSISTOR 2N3055	Q17	1	1		
59		610120	RESISTOR 330Ω 1/2W	R60	1	1		
60		720241	DIODE IN1360A	CR13	1	1		
61		100689	TRANSISTOR SOCKET		1	1		
62		660020	#4 STAND-OFF		1	1		
63		T990290	MICA-WASHER		1	R		
64		T990307	"		2	R		
65		T990350	NYLON INSUL. RING		1	R		

REVISIONS DESCRIPTION	REV	MODEL	JOB NO.	LOT QTY	LOT NO.	CODE 52541
		PLANNER	PREP DATE	SYSTRON DONNER CORPORATION		
			CHK'D	SHIPPING ASS'Y		
		MAT. DUE	APPD	RS40-10-PS26633		
		B/U REQ.		DRAWING NO.		
		B/U COMP		SIZE	DASH NO.	
			USED ON	—	P 009186	
				SHEET 2	OF 6	

FORM DB-A 11 JUL 75

ITEM NO.	SIZE	PART NUMBER	DESCRIPTION	REFERENCE NO.	ASSY QTY	ACT. CODE	ISS. QTY	ISS. CODE
67		PD8025	CHOKE ASSY		1	2		
68		503105	CHOKES	L1, L2	2	2		
69		PD20930	CHOKE WINDING INST.		1	R		
70		061798	" BOARD		1	2		
71		T030098	" "		2	2		
72	B	070300	CHOKE MTG BKT		1	2		
78	B	PD14810	INPUT PLATE ASSY		1	2		
79	C	083308	INPUT PLATE		1	2		
80		831226	CONNECTOR MS3102R-18-4P	J4	1	1		
81		840200	FUSE-HOLDER	F1	1	1		
82		870210	FUSE - 15A SLO-BLO		1	1		
86		PD14510	OUT-PUT-PLATE ASSY		1	2		
87	C	083298	OUT-PUT-PLATE		1	2		
88		831554	CONNECTOR MS3124E-14-19S	J5	1	1		
89			J5-CONNECTOR WIRING	PD14810A	1	R		
91	A	PD15069	HEAT-SINK ASSY #1		1	2		
92	B	T049380	HEAT-SINK		1	2		
93		720300	SCR MCR649AP-4	CR9 CR10	2	1		
94		830101	TRANSISTOR SOCKETS		2	1		
95		T990290	MICA-WASHERS		2	R		

MODEL	JOB NO.	LOT QTY	LOT NO.	CODE 52
PLANNER	PREP DATE		SYSTRON DONNER CORPORATION	
MAT. DUE	CHK'D		SHIPPING ASSY FS-40-10AS2655	
B/U REQ.	ISS'D		DRAWING NO.	
B/U COMP	USED ON		DWG SIZE P	909186
REVISIONS DESCRIPTION REV			SHEET 3	OF 6

FORM E8-A 11 JUL 78

ITEM NO.	SIZE	PART NUMBER	DESCRIPTION	REFERENCE NO.	ASSY QTY	ACT. CODE	ISS. QTY
100	A	PD15070	HEAT-SINK ASS'Y #2		1	2	
101		T049380	HEAT-SINK		1	2	
102		700080	TRANSISTORS 2N3055	Q13, Q14	2	1	
103		830101	TRANSISTOR SOCKETS		2	1	
104		860020	#4 - STAND-OFFS		3	1	
105		T990290	MICA-WASHERS		2	R	
106		640020	RESISTORS .2Ω - 3W	R55 R69	2	1	
107		610030	" 47Ω - 1/2W	R54	1	1	
111	A	PD15071	HEAT-SINK ASS'Y #3		1	2	
112		T049350	HEAT-SINK		1	2	
113		700080	TRANSISTOR 2N3055	Q15, Q16	2	1	
114		830101	TRANSISTOR SOCKETS		2	1	
115		860020	#4 - STAND-OFFS		2	1	
116		T990290	MICA-WASHERS		2	R	
117		640020	RESISTORS .2Ω - 3W	R58 R70	2	1	
121	D	PD14809	MAIN P.C. BOARD ASS'Y		1	2	
122	C	TC81033	P.C. BOARD		1	2	
123		600071	POT 150Ω 1/2W	R6	1	1	
124		600204	2KΩ 1/2W	R11	1	1	
125		600290	5KΩ 1/2W	R75	1	1	
126		600364	25KΩ 1/4W	R43	1	1	
127		610022	RESISTOR 10Ω 1/2W	R35 R37	2	1	
128		610070	100Ω 1/2W	R36 R48 R28	3	1	
129		610100	220Ω 1/2W	R79	1	1	
130		610180	1KΩ 1/2W	R20 42, 61	5	1	
131			S/A R20	R62, 19			
132		610290	10K - 1/2W	R47 R22	2	1	

MODEL	JOB NO.	LOT QTY	LOT NO.	CODE
				5

PLANNER	PREP DATE	SYSTRON DONNER CORPORATION	
	CHK'D	SHIPPING ASS'Y	
MAT. DUE	APP'D	TS40-10/TS260-3	
B/U REQ.			
B/U COMP	USED ON	DET SIZE — P 009186	
		SHEET 2	6

SYSTRON DONNER DIVISION

FORM E6-A 11 JUL 75

ITEM NO.	SIZE	PART NUMBER	DESCRIPTION	REFERENCE NO.	ASSY QTY	ACT. CODE	ISS. QTY	SHT. QTY
166			MAIN P.C. BOARD ASS'Y (CONT.)		XX	XX		
168		720461	DIODE IN823/SV515	CR14	1	1		
169		720181	IN751A	CR23	1	1		
170		720192	IN753B	CR22, 24	2	1		
171		720262	IN2163A	CR15	1	1		
172		720384	IN4384	CR1, CR2, 3	18	1		
173			S/A CR1	CR4, 5, 6, 16				
174				CR18, 19, 20				
175				CR21, 26, 27				
176				CR28, 29, 30				
177				CR31, 36				
178		720145	UNIJUNCTION - 2N2647	Q12	1	1		
180		800006	CAPACITOR .001MF-600V	C3	1	1		
181		800025	.0033MF-600V	C2	1	1		
182		800090	.01MF-600V	C4	1	1		
183		800125	.022MF-400V	C6	1	1		
184		800147	.047MF-250V	C13	1	1		
185		810008	2.2MF-50V	C7				
187A		PD14816	PROGRAM ADJUST ED ASS'Y		1	2		
188B		080378	PROGRAM BOARD	1	1	2		
189		600070	POT 15Ω 1/2W	R89 R90	2	1		
190		102062	RESISTOR 150Ω 1/2W 1%	R32	1	1		
191		620195	" 562Ω 1/2W 1%	R31	1	1		
193		TP42014	AC - HARNESS		1	2		
194A		PD19712	" " LIST (RS18)					
195A		PD6925	JUMPERS		1	2		
196		TP42010	DC - HARNESS		1	2		
197A		PD14813	" " LIST (RS19 - WITH OVERLAY PD14817)					
198A		PD22097	JUMPERS - (J5 - CONN.)		1	2		

MODEL	JOB NO.	LOT QTY	LOT NO.	CODE 5256
PLANNER	PREP DATE		SYSTRON DONNER	
	CHK'D		SHIPPING ASS'Y	
MAT. DUE	APP'D		RS40-10PS2603D	
B/U REQ.			DRAWING NO.	
B/U COMP	USED ON		SIZE P 009186	
			SHEET 6 OF 6	

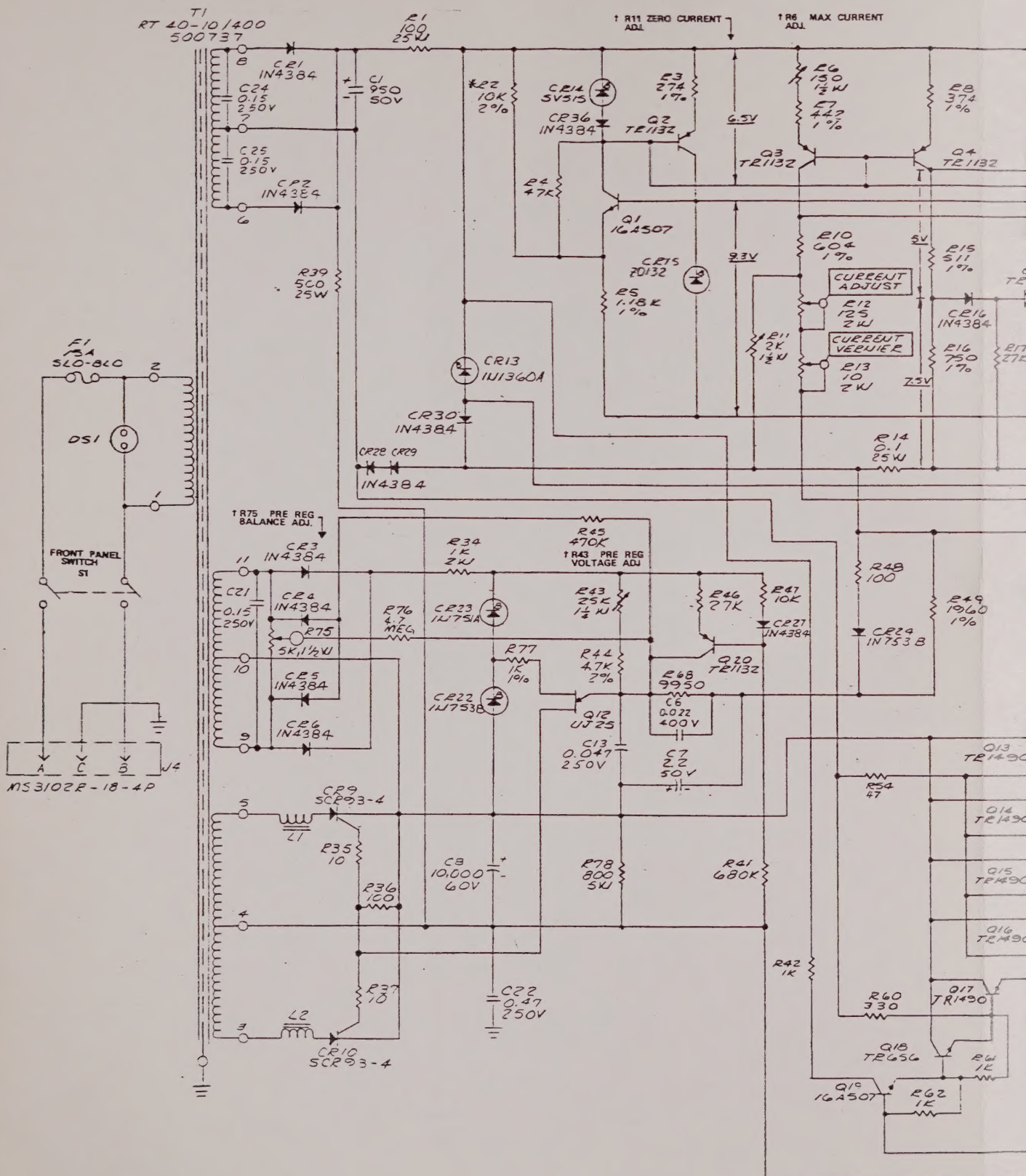
REVISIONS DESCRIPTION

FORM LB-A 11 JUL 75

ITEM NO.	SIZE	PART NUMBER	DESCRIPTION	REFERENCE NO.	ASSY QTY	ACT CODE	ISS. QTY
133			MAIN P.C. BOARD ASS'Y (SMT)				
135		610320	RESISTOR 27K-1/2W	R17 R46	2	1	
136		101437	47K-1/2W	R4	1	1	
137		610350	100K-1/2W	R21	1	1	
138		610750	470K-1/2W	R45	1	1	
139		610850	680K-1/2W	R41	1	1	
140		611135	4.7MEG	R76	1	1	
141		620095	274 Ω 1/2W	R3	1	1	
142		620135	374 Ω 1/2W	R8	1	1	
143		620155	442 Ω 1/2W	R7 R9	2	1	
144		620180	511 Ω 1/2W	R23 R15	2	1	
145		620210	604 Ω	R10	1	1	
146		620250	750 Ω 1/2W	R27,26,16	3	1	
147		620300	1K Ω 1/2W	R18 R77	2	1	
148		620320	1.18K Ω 1/2W	R5	1	1	
149		620340	1.24K Ω 1/2W	R25	1	1	
150		620360	1.5K Ω 1/2W	R24	1	1	
151		620402	1.96K Ω 1/2W	R49	1	1	
152		620430	3.01K Ω 1/2W	R29 R30	2	1	
153		620530	4.7K Ω 1/2W	R44	1	1	
154		620600	9.95K Ω 1/2W	R68	1	1	
155		620610	10K Ω 1/2W	R2	1	1	
156		630240	85 Ω 3W	R33	1	1	
157		640500	1K Ω 2W	R34	1	1	
159		705067	TRANSISTOR 2N2905A	Q5 Q6 Q7	7	1	
160			S/A Q5	Q2 Q3 Q4			
161			S/A Q5	Q20			
162		700205	2N3440	Q18	1	1	
163		700180	2N2714/16A507	Q1, Q8, Q9	6	1	
164			S/A Q1	Q10, Q11, Q19			

REVISIONS DESCRIPTION	REV	MODEL	JOB NO.	LOT QTY	LOT NO.	CODE IDENT 52541
		PLANNER	PREP DATE	SYSTRON DONNER CORPORATION		
			CHK'D	SHIPPING ASSY		
		MAT. DUE	APP'D	RS-40-10RS2600S1		
		B/U REQ.		DRAWING NO.		
		B/U COMP	USED ON	SHEET 5 OF 6	— P 009186	

FORM EB-A . 11 JUL 75


T1
RT 40-101400
500737
R1
100
25W
† R11 ZERO CURRENT ADJ.
† R6 MAX CURRENT ADJ.
CR1
IN4384
C24
0.15
250V
C25
0.15
250V
CR2
IN4384
C1
950
50V
R22
10K
2%
CR14
SV515
CR36
IN4384
Q2
TR1132
E3
274
1%
R6
130
½W
R7
442
1%
R8
374
1%
Q3
TR1132
Q4
TR1132
6.5V
R4
47K
Q1
1G4507
9.3V
CR15
20132
R5
1.18K
1%
R10
604
1%
5V
R15
511
1%
CURRENT ADJUST
R12
125
2W
CURRENT VERNIER
R13
10
2W
R11
2K
1½W
R16
750
1%
7.5V
CR16
IN4384
R39
500
25W
F1
3A
SLO-BLO
DS1
CR13
IN1360A
CR30
IN4384
CR28 CR29
IN4384
R14
0.1
25W
† R75 PRE REG BALANCE ADJ.
R45
470K
† R43 PRE REG VOLTAGE ADJ
CR3
IN4384
R34
1K
2W
FRONT PANEL SWITCH
S1
C21
0.15
250V
CR4
IN4384
R75
5K, 1½W
R76
4.7
MEG
CR23
IN753A
R43
25K
1¼W
R46
27K
R47
10K
CR27
IN4384
R48
100
R49
19960
1%
CR24
IN753B
R77
1K
1%
R44
4.7K
2%
Q20
TR1132
R68
9950
CR22
IN753B
Q12
UJ25
C6
0.022
400V
C13
0.047
250V
C7
22
50V
CR5
IN4384
CR6
IN4384
J4
MS3102R-18-4P
A
C
B
CR9
SCR 93-4
L1
R35
10
R36
100
C8
10,000
60V
R78
800
5W
R41
680K
R54
47
Q13
TR1490
Q14
TR1490
Q15
TR1490
Q16
TR1490
R42
1K
Q17
TR1490
R60
330
Q18
TR6S6
R61
1K
Q19
1G4507
R62
1K
R37
10
L2
C22
0.47
250V
CR10
SCR 93-4

REVISIONS			
SYM	DESCRIPTION	DATE	APPD
A	MODEL WAS RS40-10A/M S2603; REMOVED ETP FROM PINS P & R - ECN No 3372	8-12-67	WW
B	DELETE C20, ADD C24, C25	11-2-67	P.E.
C	CR1, 2, 36, 30, 18, 19, 16, 21, 20, 31, 26, 27, 24, 3, 4, 5, 6, 28, 29, WERE G100B - ECN 3201	9-16-67	K.E.
D	CHANGED AS PER ECN 4403	7-7-69	
E	CHANGED AS PER ECN 4339 2C	7-8-69	
F	J4 WAS J1, J5 WAS J2 - ECN 4692	10-22-69	
G	R22 (1K NOM) WAS 10K. ECO 15515	4-8-86	RV

R9 4.42 1%
DS2 (CURRENT MODE)
R71 820 10%
R79 220
Q5 TP 1132
Q8 16A307
Q9 16A307
R29 3.01K 1%
R30 3.01K 1%
R31 562 1%
R89 150 1½W ↑ R89 MAXIMUM VOLTS ADJ
R90 150 1½W ↑ R90 ZERO VOLTS ADJ.
R19 1K
CR18 IN4384
CR19 IN4384
R24 1.5K 1%
C4 .01
R28 100
GRD
Q7 TP1132
C2 .0033
R23 511 1%
R25 1.24K 1%
Q10 16A307
Q11 16A307
R32 150 1%
R80 1K
C3 .001
R22 1K NOM
R21 100K
R26 750 1%
R27 750 1%
CR21 IN4384
+V
J5
CR20 IN4384
C5 .047 250V
R33 85 3W
CR31 IN4384
C10 9300 50V
*R86 29.95K ½%
VOLTAGE ADJUST R66 4.5K 2W
VOLTAGE VERNIER R67 125 2W
C11 10 50V
RVP
CR25 TC0129
C16 10 50V
CR26 IN4384
C12 .047 250V
-V
R49 0.2 3W
R55 0.2 3W
R70 0.2 3W
R58 0.2 3W

NOTE: CALIBRATION POINTS IDENTIFIED BY ↑

NOTE: FRONT PANEL ADJUSTMENTS IDENTIFIED BY BOXING

NOTE: AN ASTERISK (*) IS USED TO IDENTIFY PRODUCTION TEST SELECTED PARTS.

NOTE: UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE IN OHMS 1/2 WATT. CAPACITORS ARE IN MICROFARADS

J5		
A	A	+S
B	B	+V
C	C	+V
D	D	+V
E	E	+V
P	P	
R	R	
T	T	
U	U	
V	V	
L	L	GND
M	M	GND
F	F	-S
G	G	-V
H	H	-V
J	J	-V
K	K	-V

MS3126E-14-1 — MS3126E-14-19P

SYSTRON DONNER
A Member of the THORN EMI Group

QTY PROD	SYM	ITEM NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	SPECIFICATION MATERIAL	REF DESIG

LIST OF MATERIALS

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ±

USED ON | NEXT ASSY | APPLICATION | FINISH | MATERIAL

	SIGNATURE	DATE
DR	D. R. MILLER	12-23-67
DWG SUP		
CHK		12-24-67
DES ENGR		
ENGR		12-24-67
ENGR		
PROJ APPD		

JOB No 22882

TRYGON ELECTRONICS INC.
ROOSEVELT NEW YORK

MODEL RS40-10A/M S2603A/B

SCHEMATIC

CODE IDENT NO	SIZE		REV
09206	D	083230	G

SCALE N/A SHEET 1 OF 1

MP MASTER
MA34158